

### **Amendments To The Claims:**

This listing of claims replaces all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1. (Currently Amended) An apparatus, comprising:  
a carrier substrate having a visible surface and a heat generating component coupled to the carrier substrate; and  
a thermochromatic material having an activation temperature, disposed adjacent to the carrier substrate, wherein the thermochromatic material ~~to produce~~ produces a visual change of the visible surface when ~~an~~ the activation temperature of the thermochromatic material is reached,  
wherein the carrier substrate coupled to the heat generating component comprises normal operating temperatures when the carrier substrate and heat generating component operate normally, and  
wherein the activation temperature of the thermochromatic material is selected to have its activation temperature above the highest desired normal range of operating temperatures of the carrier substrate coupled to the heat generating component.
2. (Original) The apparatus of claim 1, wherein the carrier substrate comprises a printed circuit board.
3. (Original) The apparatus of claim 2, wherein a solder mask material is part of the visible surface.
4. (Original) The apparatus of claim 1, wherein the thermochromatic material comprises a leucodye to change from a first color to a transparent state.
5. (Original) The apparatus of claim 1, wherein the thermochromatic material comprises N-isopropylacrylamide to change from a first color to a transparent state.

6. (Original) The apparatus of claim 1, wherein the thermochromatic material comprises a liquid crystal to change from a first color to a second color.
7. (Original) The apparatus of claim 3, wherein the thermochromatic material comprises a layer above the solder mask.
8. (Previously Presented) The apparatus of claim 3, wherein the solder mask material comprises a first transparent layer, and wherein the thermochromatic material further comprises a second layer disposed below the first transparent layer.
9. (Original) The apparatus of claim 1, wherein the carrier substrate further comprises component identification markings printed with the thermochromatic material.
10. (Currently Amended) A printed circuit board, comprising:  
a signal layer coupled to a heat generating component;  
a solder mask layer disposed above the signal layer; and  
a thermochromatic layer disposed adjacent to the solder mask layer, wherein the thermochromatic layer has an activation temperature to change a visible surface of the printed circuit board from a first visible state to a second visible state,  
wherein the printed circuit board comprises normal operating temperatures when the printed circuit board operates normally, and  
wherein the activation temperature of the thermochromatic layer is selected to have its activation temperature substantially above the highest desired normal operating temperatures of the printed circuit board.
11. (Original) The printed circuit board of claim 10, wherein the first visible state comprises a first color and the second visible state comprises a second color.
12. (Original) The printed circuit board of claim 11, wherein the thermochromatic layer comprises a liquid crystal material.
13. (Original) The printed circuit board of claim 10, wherein the first visible state comprises a first color and the second visible state comprises a transparent state.

14. (Original) The printed circuit board of claim 13, wherein the thermochromatic layer comprises a leucodye material.

15. (Original) The printed circuit board of claim 13, wherein the thermochromatic layer comprises N-isopropylacrylamide.

16. (Original) The printed circuit board of claim 10, wherein the thermochromatic layer is disposed above the solder mask layer.

17. (Original) The printed circuit board of claim 10, wherein the solder mask layer is transparent, and wherein the thermochromatic layer is disposed below the solder mask layer.

18. (Original) The printed circuit board of claim 10, wherein the thermochromatic layer is integrated with the solder mask layer.

19. – 29. (Canceled)

30. (Currently Amended) A detection apparatus, comprising:

a carrier substrate having a visible surface;

a heat generating component coupled to the carrier substrate; and

a thermochromatic material, adjacent the carrier substrate, for detecting heat from the component, which is in excess of normal operating conditions,

wherein the carrier substrate coupled to the heat generating component comprises normal operating temperatures when the substrate and the heat generating component operate normally, and

wherein the thermochromatic material is selected to have ~~has~~ an activation temperature above the normal operating temperatures of the carrier substrate coupled to the heat generating component ~~temperature of the component coupled to the carrier substrate,~~ and

wherein the thermochromatic material provides a visual thermal differential of those areas on the carrier substrate ~~having coupled to the heat generating component~~ components

with temperatures above ~~its~~ ~~their respective highest desired~~ normal range of operating temperatures.

31. (Previously Presented) The detection apparatus of claim 30, wherein the carrier substrate is selected from the group consisting of: printed circuit boards (PCB), motherboards, daughterboards, controller boards, video adapters, and network interface cards.

32. (Previously Presented) The detection apparatus of claim 30, wherein the heat generating component is selected from the group consisting of: processors, chipsets, graphic chips, voltage regulator components, and any combination thereof.

33. (Previously Presented) The detection apparatus of claim 30, wherein the activation temperature is between about 30°F and about 200°F.

34. (Previously Presented) The detection apparatus of claim 30, wherein the visual thermal differential is useful in providing diagnostic and identification procedures.

35. (Previously Presented) The detection apparatus of claim 34, wherein the visual thermal differential is useful for identifying inefficient heat dissipation.

36. (Previously Presented) The detection apparatus of claim 34, wherein the visual thermal differential is useful for identifying the elevated temperature of a defective component coupled to the carrier substrate.

37. (Previously Presented) The detection apparatus of claim 30, wherein the thermochromatic material comprises a combination of color changing inks.

38. (Previously Presented) The detection apparatus of claim 30, wherein a solder mask material is part of the visible surface.

39. (Previously Presented) The detection apparatus of claim 38, wherein the solder mask material has similar properties to that of the thermochromatic material.

40. (Previously Presented) The detection apparatus of claim 38, wherein the solder mask material and the thermochromatic material are mixed to form a single layer above a signal layer.

41. (Currently Amended) A diagnostic detection apparatus, comprising:  
a means for coupling a heat generating component to a carrier substrate having a signal layer, wherein the carrier substrate coupled to the heat generating component comprises normal operating temperatures when the carrier substrate and heat generating component operate normally;

a thermochromatic layer above the heat generating component, wherein the thermochromatic layer is selected to have an activation temperature above the normal operating temperatures of the carrier substrate coupled to the heat generating component;

a means for producing a visible change of the thermochromatic layer when the carrier substrate coupled to the heat generating component is operating above the ~~highest~~ desired normal operating ~~ranges of~~ temperatures of the heat generating component; and

a means for observing said visible change of the thermochromatic layer.

42. (Previously Presented) The diagnostic detection apparatus of claim 41, further comprising a solder mask layer disposed above the signal layer.

43. (Previously Presented) The diagnostic detection apparatus of claim 41, wherein the carrier substrate is selected from the group consisting of: printed circuit boards (PCB), motherboards, daughterboards, controller boards, video adapters, and network interface cards.